

TRANSFER OF MASCAGNIA LETICIANA TO MALPIGHIA (MALPIGHIACEAE)

William R. Anderson
Charles C. Davis
University of Michigan Herbarium
3600 Varsity Drive
Ann Arbor, Michigan 48108-2287

ABSTRACT. *Mascagnia leticiiana* W. R. Anderson is transferred to *Malpighia* to become *Malpighia leticiiana* (W. R. Anderson) W. R. Anderson & C. Cav. Davis, on the basis of a new phylogenetic analysis of DNA sequences and morphological characters. The morphology of *M. leticiiana* is illustrated and discussed in the context of the problem of distinguishing between *Malpighia* and *Mascagnia*.

Anderson (1990) assigned *Mascagnia leticiiana* W. R. Anderson to *Mascagnia* because of its samara-like fruit. In a new, unpublished phylogenetic analysis of Malpighiaceae, *Mascagnia leticiiana* is nested within a very strongly supported *Malpighia* clade (see Fig. 1). The purpose of this paper is to transfer this species from *Mascagnia* to *Malpighia*, and to discuss its morphology and the problem of distinguishing between *Malpighia* and *Mascagnia*.

Malpighia leticiiana (W. R. Anderson) W. R. Anderson & C. Cav. Davis, comb. nov.
Mascagnia leticiiana W. R. Anderson, Contr. Univ. Michigan Herb. 17: 48.
1990. Fig. 2a–g.

This species could fit into either *Malpighia* or *Mascagnia* in terms of its stipules, leaf glands, petal color, androecium, and gynoecium; those characters support Anderson's contention (1990) that *Malpighia* and *Mascagnia* are closely related, but do not provide a basis for assigning *M. leticiiana* to one genus or the other. On the other hand, the golden needle-like hairs of *M. leticiiana* are found in no species of *Mascagnia* but are common in *Malpighia*, and no species of *Mascagnia* forms trees 6 m tall, which was the size of the type and only known collection of *M. leticiiana*; such trees do occur in *Malpighia*. On both of these bases *M. leticiiana* belongs in *Malpighia*. In addition, the short axillary umbels of *M. leticiiana* are like the inflorescences of many (but not all) species of *Malpighia*, whereas most species of *Mascagnia* have the flowers ultimately borne in pseudoracemes. This character, however, should be interpreted with caution, because the umbels of *Malpighia* are condensed pseudoracemes and the inflorescence may not prove to be a reliable discriminator between these genera (Anderson 2001).

The real problem with *M. leticiiana* lies in its fruits. *Malpighia* and *Mascagnia* have, for the most part, very different fruit types. In *Malpighia* the fruit is a fleshy bird-dispersed berry, indehiscent except in *M. albiflora* (Cuatrec.) Cuatrec. and *M. verruculosa* W. R. Anderson, in which the fleshy pyrenes grow apart as they mature and separate at maturity. In *Mascagnia* the fruit is dry and dehiscent, breaking apart at maturity into three membranous samaras with large lateral wings; for an example of those samaras, see the illustration in this volume of *Mascagnia cordifolia* (Adr. Juss.) Griseb. (Anderson & Davis 2005). This seemingly unequivocal distinction is weakened by the presence of rudimentary winglets on the pyrenes of *Malpighia*,

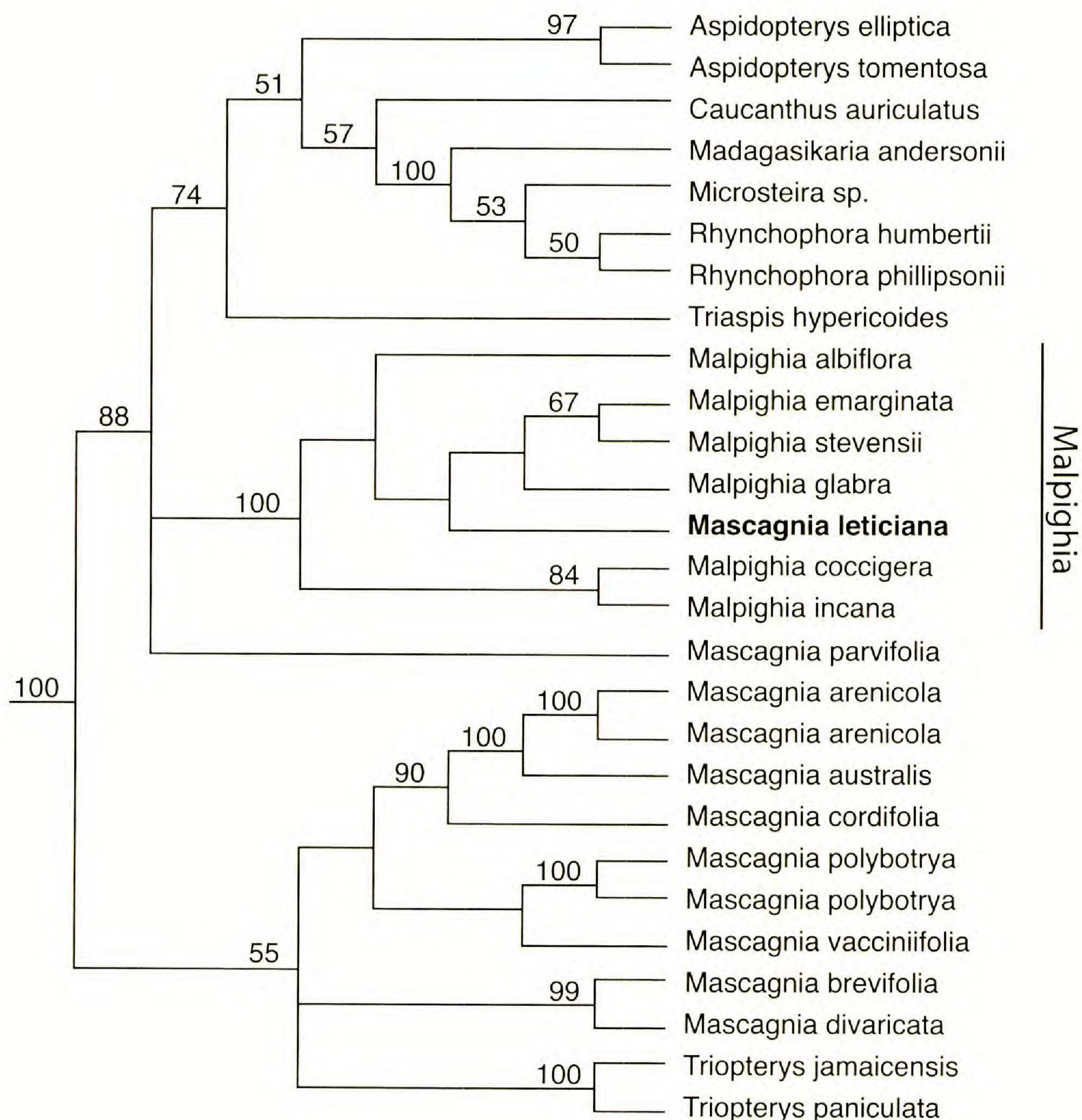


FIG. 1. Phylogenetic tree for 25 species of Malpighiaceae, representing the malpighioid clade (sensu Davis et al. 2001). Bootstrap values are given above branches for clades supported at $\geq 50\%$. The reduced strict consensus tree shown here is extracted from a larger phylogenetic analysis of Malpighiaceae using combined DNA sequences from plastid *matK*, *ndhF*, and *rbcL*, nuclear *PHYC*, and morphology; all genes were sequenced for all taxa (Davis & Anderson, unpublished data). Vouchers for collections sequenced are given in Appendix 1.

buried in the fleshy pericarp (Anderson 1978; see here Fig. 2h–j; note that the fruit shown in i and j was not dehiscent, but when the flesh holding the pyrenes together was removed the pyrenes could be separated). Those rudimentary winglets suggest the probable origin of *Malpighia* from a *Mascagnia*-like ancestor with a winged, wind-dispersed fruit. Nevertheless, for most species the distinction between *Malpighia* and *Mascagnia* is easy if one has fruits—if the fruit is indehiscent and fleshy the genus is *Malpighia*, and if it is dry, dehiscent, and samaroid the genus is *Mascagnia*.

When Anderson (1990) studied the immature fruits on the type of *M. leticiana*, he found them to be small and coriaceous (suggesting that they may have been somewhat fleshy), but conspicuously winged (Fig. 2g). The fruits were not dehiscent, but he had no difficulty separating the mericarps and concluded that they probably do separate at maturity. We have no way of knowing how fleshy the fruits may have been

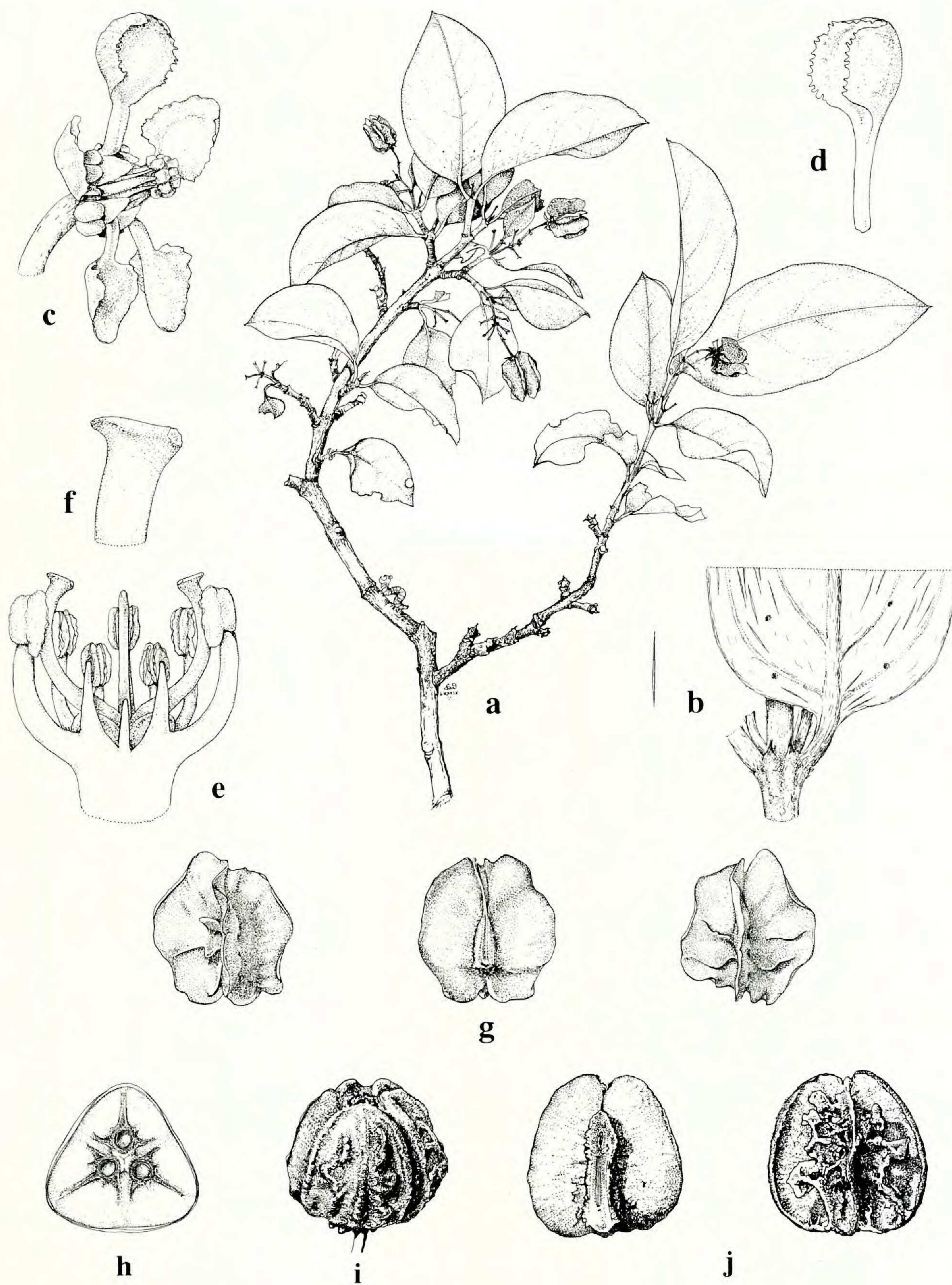


FIG. 2. *Malpighia leticiana*, *M. novogaliciana*, and *M. rzedowskii*. a–g, *M. leticiana*: a. Branch with fruits, $\times 0.5$. b. Node and abaxial surface of leaf, $\times 2.5$, with one needle-like hair enlarged, $\times 5$. c. Flower, side view, with posterior petal uppermost, $\times 2.5$. d. Posterior petal, $\times 4$. e. Androecium and gynoecium, with anterior style in center and anthers removed from three posterior stamens, $\times 6$. f. Apex of style, $\times 20$. g. Three views of immature mericarps, one adaxial (in center) and two abaxial, $\times 1.5$. h. *M. novogaliciana*: cross-section of immature fruit to show developing wings of pyrenes, $\times 1.5$. i, j, *M. rzedowskii*: i. Dried fruit, intact, $\times 1.5$. j. Pyrenes with flesh removed, adaxial view (left) and abaxial view (right), $\times 1.5$. (Based on: a–g, Torres C. 629, MICH; h, Bornstein 89b, MICH; i, j, McVaugh 16037, MICH.)

before being dried. The mericarps of *M. leticihana* are perplexing because they do not quite resemble the samaras of *Mascagnia* or the pyrenes of any known species of *Malpighia*. Faced with this dilemma, Anderson chose to rely on the dry (?) dehiscent (?) winged fruits as the most reliable indicator of generic position and assigned the species to *Mascagnia*.

Given our new phylogenetic analysis and the morphological characters mentioned above, we now believe this species is best placed in *Malpighia*; however, it remains anomalous and problematic in that genus, too. Anderson suggested that *M. leticihana* might represent an intermediate between *Mascagnia* and *Malpighia*, “with small leathery samaras that became fleshy, thereby shifting from wind to birds as the agent of dispersal” (Anderson 1990, p. 48). There may still be some conceptual merit in thinking about this plant in that way, especially if future analyses place *M. leticihana* sister to the core fleshy-fruited *Malpighia* clade; however, at the moment there is very little support for the exact position of this species within *Malpighia* (Fig. 1). Alternatively, if *M. leticihana* is confirmed to be well nested within *Malpighia*, as suggested (albeit weakly) by Fig. 1, it will have to be considered a species in which an indehiscent fleshy fruit reverted to something that secondarily resembles a *Mascagnia*-like cluster of three samaras.

ACKNOWLEDGMENTS

C. Davis was supported by NSF ATOL (EF 04-31242), by a Rackham Faculty grant from the University of Michigan, and by the Michigan Society of Fellows. Figure 2 is a composite of drawings made by Karin Douthit at various times over the last 17 years; her talent and consistent production of beautiful drawings from difficult material are much appreciated.

LITERATURE CITED

- Anderson, W. R. 1978 [“1977”]. Byrsonimoideae, a new subfamily of the Malpighiaceae. *Leandra* 7: 5–18.
 ———. 1990. Notes on neotropical Malpighiaceae—III. *Contr. Univ. Michigan Herb.* 17: 39–54.
 ———. 2001. Malpighiaceae. In *Flora de Nicaragua, Angiospermas (Fabaceae–Oxalidaceae)*, ed. W. D. Stevens, C. Ulloa Ulloa, A. Pool, and O. M. Montiel. *Monogr. Syst. Bot.* 85(2): 945–1910.
 Anderson, W. R., and C. C. Davis. 2005. The *Mascagnia cordifolia* group (Malpighiaceae). *Contr. Univ. Michigan Herb.* 24: 33–44.
 Davis, C. C., W. R. Anderson, and M. J. Donoghue. 2001. Phylogeny of Malpighiaceae: Evidence from chloroplast *NDHF* and *TRNL-F* nucleotide sequences. *Amer. J. Bot.* 88: 1830–1846.

APPENDIX 1

VOUCHERS FOR SPECIES IN FIGURE 1

- Aspidopterys elliptica* (Blume) Adr. Juss.: *Bogor XVI.G.110* (BO)
Aspidopterys tomentosa (Blume) Adr. Juss.: *Tsi Zhanhuo 92-121* (MO)
Caucanthus auriculatus (Radlk.) Nied.: *Knox 2128* (MICH)
Madagasikaria andersonii C. Cav. Davis: *Davis 20-01* (A)
Malpighia albiflora (Cuatrec.) Cuatrec.: *Anderson 13815* (MICH)
Malpighia coccigera L.: *University of Michigan Botanical Garden 20626* (MICH)
Malpighia emarginata DC.: *Anderson 13621* (MICH)
Malpighia glabra L.: *Fairchild Tropical Garden X-12-104* (FTG)
Malpighia incana Mill.: *Fairchild Tropical Garden 81-303B* (FTG)
Mascagnia leticihana W. R. Anderson [= *Malpighia leticihana*]: *Torres C. 629* (MICH)
Malpighia stevensii W. R. Anderson: *Davis 1019* (MICH)
Mascagnia arenicola C. Anderson: *Chase 90160* (MICH); *Chase 90165* (MICH)
Mascagnia australis C. Anderson: *Anderson 13592* (MICH)

Mascagnia brevifolia Griseb.: Nee 51409 (MICH)

Mascagnia cordifolia (Adr. Juss.) Griseb.: Anderson 13626 (MICH)

Mascagnia divaricata (H. B. K.) Nied.: Anderson 13604 (MICH)

Mascagnia parvifolia (Adr. Juss.) Nied.: Salinas T. 5444 (MICH)

Mascagnia polybotrya (Adr. Juss.) Nied.: Anderson & Laskowski 4098 (MICH); McVaugh 24004 (MICH)

Mascagnia vacciniifolia Nied.: Anderson 13797 (MICH)

Microsteira sp.: Davis 38-01 (A)

Rhynchophora humbertii Arènes: Davis 18-01 M (A)

Rhynchophora phillipsonii W. R. Anderson: Davis 23b-01 (A)

Triaspis hypericoides Burch.: Immelman 650 (PRE)

Triopterys jamaicensis L.: Hammel 17816 (MICH)

Triopterys paniculata (Mill.) Small: Veloz et al. 862 (MICH)